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Application No. 10/777,014
Amendment dated October 31, 2007
After Final Office Action of October 22, 2007

Docket No.: CVRS-P04-001

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-46. (Cancelled)

47. (Currently amended) An apparatus for processing one or more samples to produce a desired result, comprising:

(a) a reaction vessel for holding the one or more samples and including at least one inlet for flowing the one or more samples into the reaction vessel and at least one outlet for flowing the one or more samples out of the reaction vessel; and

(b) an acoustic energy source ~~a transducer~~ for providing at least one focused acoustic field, having a frequency of between about 100 kilohertz and about 100 megahertz and a focal zone having a diameter of less than about 2 centimeters, to the one or more samples while the one or more samples are in the reaction vessel, ~~wherein the apparatus has only one transducer for providing an acoustic field to process the one or more samples to produce the desired result.~~

48. (Previously presented) The apparatus of claim 47, wherein the at least one focused acoustic field has a focal zone smaller than the reaction vessel.

49. (Previously presented) The apparatus of claim 47, wherein the at least one focused acoustic field has a focal zone larger than the reaction vessel.

50. (Previously presented) The apparatus of claim 47, including a processor for controlling the flow of the one or more samples into and out of the reaction vessel to control exposure of the one or more samples to the at least one focused acoustic field.

51. (Previously presented) The apparatus of claim 47, including a processor for controlling the transducer to control exposure of the one or more samples to the at least one focused acoustic field.

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52. **(Previously presented)** The apparatus of claim 47, including a processor for varying the frequency of the transducer to control exposure of the one or more samples to the at least one focused acoustic field.
53. **(Previously presented)** The apparatus of claim 47, including a feedback system having a sensor for providing feedback information relevant to the one or more samples.
54. **(Previously presented)** The apparatus of claim 53, including a processor for determining a state of treatment of the sample based, at least in part, on the feedback information.
55. **(Previously presented)** The apparatus of claim 54, wherein the processor controls the flow of the sample based, at least in part, on the determination of the state of treatment.
56. **(Previously presented)** The apparatus of claim 54, wherein the processor controls the transducer based, at least in part, on the determination of the state of treatment.
57. **(Previously presented)** The apparatus of claim 53, wherein the sensor includes an acoustic transducer for detecting acoustic emissions from the one or more samples.
58. **(Previously presented)** The apparatus of claim 53, wherein the sensor includes an acoustic transducer for detecting acoustic reflections from the one or more samples.
59. **(Previously presented)** The apparatus of claim 53, wherein the sensor includes a temperature sensor and the feedback information includes temperature information.
60. **(Previously presented)** The apparatus of claim 53, wherein the sensor includes optical detection and the feedback information includes spectral information.

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61. **(Previously presented)** The apparatus of claim 60, wherein the spectral information includes at least one of spectral excitation, absorption, fluorescence, and emission of the one or more samples.
62. **(Previously presented)** The apparatus of claim 141, wherein the at least one focused acoustic field includes a plurality of focused acoustic fields and the acoustic energy source includes a plurality of acoustic transducers for providing the plurality of the focused acoustic fields to the one or more samples.
63. **(Withdrawn)** The apparatus of claim 47 including a positioning system for positioning at least one of the sample and the focused acoustic source relative to each other.
64. **(Withdrawn)** The apparatus of claim 62 including a processor for controlling the positioning system to stop sample movement relative to the acoustic energy source to facilitate the treating of the one or more samples.
65. **(Withdrawn)** The apparatus of claim 62, including a processor for controlling the positioning system to dither a relative position of the one or more samples and the focal zone.
66. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples, wherein the one or more samples include organic material.
67. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples, wherein the one or more samples include inorganic material.
68. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples, wherein the one or more samples include a mineral.
69. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples, wherein the one or more samples include a biological.

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70. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples, wherein the one or more samples are suspended in a fluid.

71. **(Previously presented)** The apparatus of claim 70, wherein the fluid includes a solvent.

72. **(Previously presented)** The apparatus of claim 47, further comprising one or more samples and a constituent.

73. **(Previously presented)** The apparatus of claim 72, wherein the constituent includes a solvent.

74. **(Previously presented)** The apparatus of claim 72, wherein the one or more samples include a first molecule and the constituent includes a second molecule, different from the first molecule.

75. **(Previously presented)** The apparatus of claim 72, wherein the one or more samples include an antibody and the constituent includes a molecule to which the antibody binds.

76. **(Previously presented)** The apparatus of claim 72, wherein the one or more samples include a substrate and the constituent includes a ligand.

77. **(Previously presented)** The apparatus of claim 72, wherein the one or more samples include at least one of an antibody and a receptor and the constituent include a support surface for immobilizing the at least one of the antibody and the receptor.

78. **(Previously presented)** The apparatus of claim 72, wherein the one or more samples include a first nucleic acid molecule and the constituent includes a second nucleic acid, different from the first nucleic acid molecule.

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79. **(Previously presented)** The apparatus of claim 78, wherein the first nucleic acid molecule is a primer and the second nucleic acid molecule is a substrate molecule.

80. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes fluidization of the one or more samples.

81. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes heating of the sample.

82. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes disrupting at least portions of the sample.

83. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes increasing a permeability of the one or more samples.

84. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes enhancing a reaction within the one or more samples.

85. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes sterilizing the one or more samples.

86. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes disrupting extra-cellular membranes.

87. **(Withdrawn)** The apparatus of claim 47, wherein the treatment includes lessening a barrier function of a structure in the one or more samples.

88. **(Withdrawn)** The apparatus of claim 47 including a processor for controlling the acoustic energy source to be on during a treat interval and off during a dead interval.

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89. **(Withdrawn)** The apparatus of claim 88, wherein the processor controls a frequency of operation of the acoustic energy source.

90. **(Withdrawn)** The apparatus of claim 88, wherein the processor controls a duty cycle of operation of the acoustic energy source.

91. **(Withdrawn)** The apparatus of claim 47, further comprising a system for transferring the reaction vessel into or out of the treatment apparatus.

92-140. **(Cancelled)**

141. **(Previously presented)** An apparatus for treating one or more samples comprising:

(a) a reaction vessel for holding the one or more samples and including at least one inlet for continuously transporting the one or more samples into the reaction vessel and at least one outlet for continuously transporting the one or more samples out of the reaction vessel, wherein each of the one or more samples is contained within a sample vessel capable of being transported into the reaction vessel via the at least one inlet and out of the reaction vessel via the at least one outlet; and

(b) an acoustic energy source for providing at least one focused acoustic field having a frequency of between about 100 kilohertz and about 100 megahertz to the one or more samples while the one or more samples are in the reaction vessel.

142. **(Withdrawn)** The apparatus of claim 47, further comprising a medium for coupling the focused acoustic field to the one or more samples, wherein said medium does not contact the sample.

143. **(Previously presented)** The apparatus of claim 47, wherein the reaction vessel is a conduit.

144. **(Withdrawn)** The apparatus of claim 143, wherein each of the one or more samples is held within a separate container included within the conduit.

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145. **(Withdrawn)** The apparatus of claim 141, further comprising a medium for coupling the focused acoustic field to the one or more samples, wherein said medium does not contact the sample.

146-147. **(Cancelled)**

148. **(Previously presented)** The apparatus of claim 141, wherein the sample vessel comprises a plurality of containers each capable of holding one of the one or more samples.

149. **(Previously presented)** The apparatus of claim 148, wherein the sample vessel comprises at least one of a microtiter plate, a blister pack, and an array of polymeric bubbles.

150. **(Previously presented)** An apparatus for treating one or more samples comprising:

(a) a conduit including at least one inlet for continuously transporting the one or more samples into the conduit and at least one outlet for continuously transporting the one or more samples out of the conduit; and

(b) an acoustic energy source for providing at least one focused acoustic field to the one or more samples while the one or more samples are in the conduit, wherein the at least one focused acoustic field substantially converges in a focal zone having a diameter less than about 2 cm.

151. **(Previously presented)** The apparatus of claim 150, including a processor for controlling the flow of the one or more samples into and out of the conduit to control exposure of the one or more samples to the at least one focused acoustic field.

152. **(Previously presented)** The apparatus of claim 150, including a processor for controlling the acoustic energy source to control exposure of the one or more samples to the at least one focused acoustic field.

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153. **(Previously presented)** The apparatus of claim 150, including a processor for varying the frequency of the acoustic energy source to control exposure of the one or more samples to the at least one focused acoustic field.

154. **(Previously presented)** The apparatus of claim 150, including a feedback system having a sensor for providing feedback information relevant to the one or more samples.

155. **(Previously presented)** The apparatus of claim 154, including a processor for determining a state of treatment of the sample based, at least in part, on the feedback information.

156. **(New)** The apparatus of claim 150, wherein the one or more samples, while in the conduit, mix with a constituent in the conduit.

157. **(New)** An apparatus for processing one or more samples, comprising:

(a) a reaction vessel for holding the one or more samples and including at least one inlet for flowing the one or more samples into the reaction vessel and at least one outlet for flowing the one or more samples out of the reaction vessel; and

(b) an acoustic energy source for providing at least one focused acoustic field having a focal zone having a diameter of less than about 2 centimeters to the one or more samples while the one or more samples are in the reaction vessel.

158. **(New)** The apparatus of claim 157, including a processor for controlling the flow of the one or more samples into and out of the reaction vessel to control exposure of the one or more samples to the at least one focused acoustic field.

159. **(New)** The apparatus of claim 157, including a processor for controlling the acoustic energy source to control exposure of the one or more samples to the at least one focused acoustic field.

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160. (New) The apparatus of claim 157, including a processor for varying the frequency of the acoustic energy source to control exposure of the one or more samples to the at least one focused acoustic field.

161. (New) The apparatus of claim 157, including a feedback system having a sensor for providing feedback information relevant to the one or more samples.

162. (New) The apparatus of claim 161, including a processor for determining a state of treatment of the sample based, at least in part, on the feedback information.